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ABSTRACT

To evaluate the effect of typing instruction on knowledge about computers, students from grades 4 through 8 attending computer literacy and programing classes were assigned to either a treatment condition providing 4 weeks of typing instruction or a control group receiving no typing instruction. It was hypothesized that pretest-posttest gains of students receiving typing instruction would be significantly greater than those of control group members. The pretest-posttest contained questions relating to care of computers, computer use, applications, and programing. In computer literacy and programing classes students were taught the components of a computer, received instruction on the care and use of computers and diskettes, and were introduced to programing in BASIC. In typing classes, treatment group students received instruction and practice in the correct finger positions for touch typing and were taught the typing game "PAWS+." Treatment group students worked at this game to increase their ability to locate letters without looking at the keyboard. Findings did not support the research hypothesis, but 4th, 5th, and 6th grade scores and overall mean scores indicated that the treatment group students gained more than the corresponding control groups. Appendices provide a survey of computer experience, the computer knowledge pretest-posttest, and a diagram of a keyboard. (RH)

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EFFECT OF TYPING SKILLS ON COMPUTER SKILLS IN ELEMENTARY SCHOOL STUDENTS

A thesis

Presented to

the Department of Education

School of Arts and Sciences

Biola University

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts in Education

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by

Linda Marie Elam

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Chapter 1

Effect of Typing Skills on Computer Skills in Elementary School Students

Background

With the growing number of computers in schools, it is becoming increasingly important to consider what should be taught to the students. The majority of students in schools today will use computers at some point in their lives. The programs that are set up in schools must take this into consideration. Most classroom teachers are not computer literate and need some guidelines as to what is more important to teach to their students in computer classes. Although it is presumed that typing is important to computer operation, typing skills are often difficult to teach to children. There are difficult concepts to be mastered, and much time is required. It should first be established whether or not typing is a necessary aspect of the elementary and junior high school computer curriculum. If typing skills are not a necessity for computer operation, then it may be more practical to leave these skills to be taught at the high school level, as has been the practice in past years, and concentrate on those abilities which deal more directly with computer literacy and programming.

Purpose of the Study

The purpose of this study is to evaluate gains in computer application made with and without accompanying instruction in typing. An experimental group would receive typing instruction in addition to computer literacy, while a control group would receive computer application and literacy instruction only.

Hypothesis

The objective of this study is to determine the value of teaching typing skills in addition to general computer literacy and programming classes. The following hypothesis is presented:

> Students who receive typing instruction in addition to computer literacy and programming classes will make significant mean gains in computer application over those who receive computer literacy and programming classes without additional typing instruction.

Procedure

This research study began with a survey of computer knowledge and typing skill designed to assist in eliminating those students who have a level of computer and/or typing

skills which may tend to bias the results of the study. A pre-test was then given in order to determine the degree to which a student already possessed an understanding of the computer. During the four week period of the experimental treatment, one half of those students enrolled in computer classes at the school were given an additional typing class. These students were selected from the fourth, fifth, sixth, seventh and eighth grade classes at Bethany Christian Academy in Midway City, California. Instruction was given on Commodore 64 computers. Each class contained from eleven to seventeen students, grouped by grade level. The experimental and control groups were enrolled in classes together to insure that neither group was given any additional information that would bias the results of the study in an unfair manner. For the purpose of this study, instruction was given from the curriculum program "Kids and the Commodore 64" published in 1983 by Datamost, Inc. Topics approached in this four week course included; NEW, PRINT, RUN, GOTO, LIST, Cursor Keys, and INPUT. At the conclusion of the study a post-test was given to measure the improvement of each student. The results were then evaluated to determine which group of students demonstrated greatest gain in computer knowledge during the four week class.

Population

The students used in this study were from Bethany Christian Academy in Midway City, California. The school, which has an enrollment of 290 students, represents a middle class population in a rapidly growing urban Southern California area. The school maintains a fairly high academic program.

Each of these students completed a computer survey designed to determine his or her eligibility for the study. The students who participated in this study have not used a computer for anything other than playing games. Those who demonstrated a working knowledge of computer literacy and programming were not used. The students participating were selected from the fourth through eighth grade classes at the school. Selections were not made in consideration of academic ability. However, those in the school who were lagging in their academic subjects were not chosen for the study on the basis that they needed to concentrate more on existing classes. This decision was made in conjunction with the individual classroom teacher who assisted in developing the list of students to be enrolled in the class.

The students were divided into classes according to grade level. Selections were made randomly as to who would receive instruction in typing along with computer

literacy and programming. The parents of these randomly selected students were then consulted as to whether or not they would participate. If a parent had not been willing to have the child be a part of this program, an alternate would have been randomly selected. This procedure, however, was not used because no parent declined to have his or her child participate. The classes contained a total of sixty-nine students, thus providing a control group of thirty-five and an experimental group of thirty-four.

Limitations

There are the following limitations to this study:

(1) All subjects in this study were drawn from a Christian school, possibly representing a sample higher in achievement and socio-economic status than a normal population drawn from most public schools.

(2) The study was conducted over a period of four weeks containing one class meeting per week for each class. This may not allow time to demonstrate the possible benefit from the inclusion of typing instruction in computer training.

Definitions

Several terms used in this study need to be defined at the outset.

Computers: This term, as used in this study, will always indicate the Commodore 64, unless otherwise specified.

Computer literacy: A term used in this study to indicate an understanding of how to operate a computer and put it to use. This includes booting a disk and the general care of a disk. It is basically used to refer to the normal care and operation of a computer.

Computer applications: Generally refers to the ability to put the computer to practical use.

Computer programming: As it applies to this study, programming will refer to BASIC programming on the Commodore 64 computer.

BASIC: A specific computer language, generally thought to be the least difficult language for a beginner to acquire.

Text: In this study text will indicate "Kids and the Commodore 64" published by Datamost, Inc. (Carlson, 1983). There will be no student manuals, only the copy used by the instructor.

Microcomputers: A term used to refer to computers small enough to be used in a home or small business setting.

Summary

This study strives to determine the validity of typing instruction through use of a control group of students which will be given instruction in computer literacy and programming, and an experimental group which will be part of the same class receiving this instruction, also receiving instruction in typing. This chapter has presented a background for the study, the purpose of the study, the hypothesis, the procedures followed, the population involved, limitations, and definition of terms.

Chapter 2

Review of the Literature

Introduction

Computers have just recently been introduced on a large scale basis into the elementary schools. While many students have computers at home, these computers are often used by the students only as a toy. Children enjoy playing games on computers, and often display a great deal of skill. Educators, however, desire to present the computer as more than just a toy. Early computer familiarity is an opportunity for the elementary students of today to gain a head start in learning a skill which may be instrumental in obtaining a desirable career position. It is important to determine how to teach them most efficiently.

This study was conducted in response to the growing number of computers in elementary schools today, and the need to make the best possible use of the limited time available to work with those students who are fortunate enough to be involved in a school offering computer classes. It was designed to be of assistance to those teachers who find themselves faced with decisions regarding computer curricula. The purpose of this study was to compare gains in computer application between a control group, which

received computer literacy and programming instruction only, and an experimental group, which received typing instruction in addition to computer literacy and programming.

Overview

This study involved sixty-nine elementary and junior high school students in the fourth through eighth grades at Bethany Christian Academy in Midway City, California. Each of the sixty-nine students participated in a four week computer literacy and programming class. Prior to the beginning of the study, all students were given a pre-test covering several areas of computer literacy and programming skills which were to be introduced and taught throughout the course. Thirty-four of these students were also enrolled in a typing class. At the end of a four week course of study, all students were given a post-test which was identical to the pre-test. Data were compared at each grade level to see if the experimental group achieved superior gains in computer knowledge. These data were also used to determine whether or not the experimental group as a whole made significant gains over the control group. At this point conclusions were drawn as to the profitability of including typing instruction in a computer literacy and programming class.

Division of Literature

This survey of the literature will be divided into three main areas of study. (1) Literature which applies to the increased availability and usage of computers in the elementary schools, including the attitude of educators towards this recent movement placing computer literacy as a priority in education; (2) literature which relates to the feelings being expressed as to what part computers should play in elementary education, and what should be included in computer curriculum; and (3) literature which deals with the specific area of the value of including typing instruction in computer application curriculum. These divisions were seen as developing a foundation on which to build and develop the research problem.

First in this section will be the question of whether computer usage is significantly wide-spread in elementary schools to warrant the attention it is receiving. The attitude of the educators involved plays a large part in this argument. Then the question of curriculum must be addressed. There is much disagreement as to exactly what part the computer should play in the elementary school. Three main schools of thought will be presented in this section: computers should be used to reinforce existing subject areas, computer literacy should include only the operation and uses of computers, and computer programming

should be included in elementary computer curriculum. Finally, the specific area of the value of typing skills to computer literacy will be examined.

Sources

Four main sources were used in reviewing the literature for this study: an ERIC search, the Education Index, the university library at Biola University, and commercial outlets such as Waldenbooks and B. Dalton. First, the ERIC computer search was conducted to locate journal articles and research papers pertaining to this subject, dating back through 1980. The descriptors used were "computer," "literacy," "elementary school students," and "instruction." The keyword "typewriting" was included, but was removed because it produced no sources. This ERIC search was able to locate only seventeen sources relating to this topic of study. Second, a thorough search was made of the Educational Index to locate periodical articles which dated back to 1980, and which dealt with this study. Many articles were found to meet the needs of those interested in how to choose software to apply to specific subjects; however, few related to the present study. Third the library card catalogue at Biola University was searched, however, this failed to produce any pertinent information. Fourth,

bookstores such as Waldenbooks and B. Dalton were searched to obtain samples of present computer curriculum. All of the above sources, taken together, failed to provide a large number of resources. However, much of the information found proved to be useful to this study.

Review of the Literature

Computer Usage in Schools

It is becoming an accepted fact in education today that computers are here to stay. This idea has been encouraged by some, fought by others, and ignored by a few. In spite of some of the protests which were lodged at the outset of this computer "revolution," they are now commonplace. Many arguments were raised against computers in the schools by teachers who feared what was new and unknown. However, today, teachers are becoming more and more interested in how computers can benefit education. Although there is much disagreement as to how computers should be used in the schools, most educators are in agreement with the fact that they will be beneficial.

A general report released by Johns Hopkins University (1983) issued findings from a national survey on the extent of microcomputer use in elementary and secondary schools. The survey results indicate that: (1) in half of the schools

with microcomputers, only one or two students are regular users; (2) many teachers have become more than mere computer users and spend much time on programming; (3) in schools with microcomputers, one student in every seven uses the computer in an average week; (4) secondary schools are more likely to have microcomputers; and to have more of them, than elementary schools; (5) secondary school students have more access time to computers than elementary school students; (6) computer access time for students increases as schools get more microcomputers; (7) more computer time is used for programming than for drills and remedial activities; and (8) in elementary schools, drill and practice programs using computers function to increase students' understanding of the computer more than to teach subject matter and basic skills.

Learning Magazine published the results of a survey (Editors, 1986) taken among teachers in schools that offered computer classes. The article, entitled "What Teachers had to Say About Using Computers in Today's Schools," stated that sixty-nine percent of those teachers surveyed displayed a positive attitude towards having computers used in their schools. Of those positive replies, the major complaint lodged regarding computers in the school was that there was inadequate time available for use of and instruction in the computers. The teachers stated that there were "too many

students and too many things to teach" which limited the effectiveness of their computer use.

In a survey done for a research report on "Computer Literacy of Entering Freshman" (Tellep, 1984), information was obtained from Pennsylvania's public schools. This study determined that "23.6% of the elementary students, 42.8% of the middle school students, and 51.9% of the high school students were receiving computer science instruction." It was also determined that the most commonly used programming language was BASIC, with many districts planning to begin teaching Pascal within the next two years. It was noted that 54.6 percent of the districts taught structure programming. It was also determined that of those computer science instructors, 35.3 percent had only undergraduate credits in computer science. This research report was completed in April of 1984 and it may be assumed that these statistics have risen over the past two years as computer awareness has increased.

In the spring of 1983, Apple Computer, Inc. initiated the "Kids Can't Wait" program through which all schools in California meeting minimum requirements received an Apple//e computer free of charge. Schools were required to place the computer in a location in which the students would have access, rather than for use by the administration. This program may have been responsible for beginning the

computer awareness of many schools in that state.

Curriculum Content

There appear to be three main lines of thought concerning what should be included in computer curriculum for elementary school students. There are those who approach the use of computers in the school based on computer assisted instruction, which consists of programs designed to supplement existing subjects through drill and practice on the computer. Many choices exist as to which subject areas will be approached. A second field of thought on the subject is that the computer should provide a study in and of itself (Markle, 1983). This group would advocate the instruction of computer histor, literacy, and programming as the primary field of study in the computer classroom. The third division in thinking believes that the computer is necessary only as a tool by which to gain skill in operation. This group does not feel it necessary to include programming or history in the curriculum (Lenkway, 1986).

Computer Assisted Instruction

An abundance of information exists in order to aid educators in the selection of software for computer assisted instruction. There appears to be a great deal of evidence

behind the thinking that this method of supplementing instruction is effective, especially in the area of mathematical computations. A study conducted in Big Lake, Texas (Dorsey, Burleson, 1982) showed that students being given fifteen minutes per week using a popular software series showed a marked improvement in math and reading. This project was staffed by teacher aides, rather than teachers. Progress is also encouraged in utilizing computers to assist in the acquisition of composition skills. The use of word processing programs is a popular method for increasing language skills (Rhodes, 1986). Computer graphics have been successfully used to encourage students in generating ideas for writing (Humes, 1982).

A meta-analysis of elementary school computer assisted instruction research (Niemac; Walberg, 1985) found that lower achievers profit more from computer assisted instruction; it is more effective in primary grades; boys may learn more than girls; and drill and practice produces the highest effect. A study was presented which concerned the ability of children to learn skills specific to controlling the computer as well as cooperative and individual problem-solving strategies, creative expression in a new medium, and abstract math and geometric principles (Jaworski, 1984). This study, based on thirteen pairs of first grade students, found this particular method of

computer assisted instruction based on controlling the computer well to be beneficial in the acquisition of desired skills.

In some cases it is felt that the teachers themselves should do the programming of educational software for computer assisted instruction (Whiting, 1985). However, this can be very time consuming, and very few teachers would have the time or the knowledge to be effective in this area.

Computer Literacy and Programming

Many forms of curriculum are available to assist the educator in the instruction of computer literacy and programming. The majority of the information found on the elementary school level involves BASIC programming. In this portion of the literature search, three current computer curriculum sources were evaluated. Of these three sources, one began the lessons immediately with BASIC programming and did not introduce anything other than the programming (Carlson, 1983). One source presented a very brief introduction to the computer prior to beginning the instruction in programming (De Jonghe; Earhart, 1984). Only one of the three sources consulted presented a history of computers and lessons on how computers work and what they are used for (Markle, 1983).

Computer Operation

There is a small percentage of educators that believes that the only purpose for having computers in school is to learn how to operate a computer. Those who follow this point of view would not teach a history of computers nor advocate the instruction in computer programming. Only an understanding of the process of computer programming would be included (Lenkway, 1986). They feel that computers are only beneficial in preparing students for their operation in the future context.

Typing Skills

A debate exists today regarding the importance of teaching typing skills for students using computers. There are those who feel that students should be proficient in typing prior to computer instruction. Others believe that typing is less necessary in computer application. The possibility exists that typewriters as we commonly know them will become obsolete with the popularity of the personal computer, and that it will no longer be necessary to acquire typing skills (McCarley, 1984).

Although much attention is given to computer course contont, very little pertains to the skills achieved through typing instruction. It is either assumed that

typing skills are necessary, or it is not felt to be an important question of curriculum. In an interview with Educational Leadership (Rhodes, 1986), Sherry Turkle, author of "The Second Self: Computers and the Human Spirit," touches on this issue briefly. Although she did not refer to typing skills, she expressed the opinion that the most important use of the computer in elementary schools is that of word processing. It would appear reasonable to assume that any good word processing curriculum would include typing instruction. A great disservice would be done if educators were to teach and encourage word processing without giving the basics of typing. It is well known that old habits are hard to break. If students are allowed to invent typing methods at an early age, it will be difficult to retrain those students when they enter high school and take typing courses.

Barbara McCarley presents more direct support for keyboarding skills in her article "QWERTY-UIOP and Other Aids for Developing Keyboarding Skills for Computer Users" (McCarley, 1984). This author believes that "typing as a subject matter area will - for many individuals - cease to exist, because it will not be a necessary skill." She adds that "it is important, however, to look at keyboarding as a set of separate and distinct skills, related to efficient use of and interaction with computers." Her

reasons for the importance of keyboarding skills are presented as "(1) it saves time; (2) it allows attention to focus upon the interaction between learner and computer; and (3) it improves understanding of computer/keyboard interface." Those keyboarding skills are to include the following: "(1) the position of the home keys: asdf jkl; (2) the row above the home keys, which contains qwerty uiop; (3) the top row which contains the numbers; (4) the bottom row of keys; and (5) special function keys." No specific distinction was given as to the difference between typing skills and keyboarding skills. However, those keyboarding skills outlined were very similar to those skills taught in a typing class, and many would say they are basically the same skills.

Summary

The review of the literature presents very little information on the relationship between typing and computer skills. It mainly dealt with what approach should be taken to computer use and instruction in the elementary schools. There was no area where all citations were in complete agreement. A majority of the sources located were in favor of using computer assisted instruction to supplement existing subjects. Some felt that computer literacy and programming should be included. Almost all sources felt

that computers were valuable to elementary schools in one aspect or another. Only one source was located that specifically stated that typewriting, or keyboarding skills, should be part of a computer curriculum.

Chapter 3

Procedures

Introduction

The growing number of computers in elementary schools today has begun to bring about a new concern among educators. It appears to be an accepted fact that computers are here to stay. Teachers now face the difficult task of determining which elements should be included in an elementary school computer literacy curriculum. There is much discussion regarding this matter, with many varying points of view. Therefore, it has become necessary to examine the many possible areas of computer literacy to be covered and decide which of these topics are most important. Because most schools dedicated a limited amount of time to computer application courses, it is crucial that this time be used to the best advantage.

Problem

The issue addressed in this study is the value of providing typing instruction to computer literacy students. It must be determined whether or not it is necessary to spend the time needed to instruct an elementary school student in the skills of typing in order to increase the

level of achievement in a computer literacy and programming course.

Objective

The purpose of this study is to compare gains in computer application between the control group, which will receive computer literacy and programming instruction only, and the experimental group, which will receive typing instruction in addition to computer literacy and programming. This study was based on the following hypothesis:

> Students who receive typing instruction in addition to computer literacy and programming classes will make significant mean gains in computer application over those who receive computer literacy and programming classes without additional typing instruction.

Procedures

Population

This study began with a computer survey designed to determine the extent to which the population from which to choose had an understanding of computer literacy and programming. This survey was given to all students in the fourth through eighth grades at Bethany Christian Academy

in Midway City, CA. The results showed that the students surveyed who had used a computer on a regular basis had used it for playing games. Even those students who had computers at home only played video games or educational games on them, or had never used them at all. The survey was also used to disqualify any students who had an extended knowledge of computers and those who had taken typing classes. The information gained from this survey showed that no student had taken a typing class and none showed a significant computer knowledge. On the basis of this survey no students were disqualified (see Appendix A).

Following the computer survey, class lists were obtained from the school office. Each classroom teacher was consulted regarding which students would participate in the program. Each individual teacher used different criteria on which to base their recommendations. All fourth grade students were used. Fifth and sixth grade students were disqualified on the basis of work not completed on a regular basis. Junior high students were selected from a study hall period, those who were disqualified were generally behind in their regular classroom studies. On the basis of the classroom teachers' selections, seventy students were selected, enough to allow for absences or disqualification of up to ten students, still allowing a minimum population sample of sixty

students.

Research

Students were chosen from each of the grade levels to be enrolled in a typing course after school. Classes were arranged so that each grade level would contain approximately equal numbers of students in the control group and the experimental group. Students were chosen randomly to participate in the experimental group. Parents were then consulted for permission for their children to take the typing class because it was only offered after school hours. No parents declined. Each of the three sections of the typing class consisted of students from a variety of grade levels. The computer literacy and programming classes, however, were taught according to grade level. Five sections of the computer literacy and programming classes were taught. Two sections contained seventeen fourth graders each, one class contained twelve fifth graders, one section contained eleven sixth graders, and one section contained twelve seventh and eighth grade students.

At the beginning of the four week period, all students were given a computer knowledge test. This was a short answer test containing questions relating to computer care, usage, application, and programming. These tests were

scored according to a point value key (see Appendix B). Only the point value was recorded for each student. These scores were recorded in order to compare point value with the final test to evaluate gained knowledge during the course.

Students were taught the components of a computer, and care and use of the computer and of the diskettes. They were then introduced to BASIC programming. Commands such as PRINT, GOTO, IF-THEN, NEW and CLEAR-HOME were taught and practiced in class. Students copied programs and were then encouraged to experiment with commands in class. Each grade level attended one thirty-minute class per week. One student moved from the school during this time, however, no students were absent from class. Therefore, all but one of the subjects were considered in the evaluation of the results.

Typing classes were conducted after school for four weeks. Each student received instruction and practice in the correct finger positions for touch typing. During this time students learned and practiced the correct finger positions for the home keys and the top row of keys. This approach was taught and practiced for the first two weeks using just the keyboard. On the third and fourth weeks the typing game "PAWS+" by Microtype was introduced and each student worked at this game to increase the ability to

locate the correct letter without looking at the keyboard. The students were monitored to be certain that they were continuing to use proper finger positions and not the "hunt-and-peck" method. Students were also given a model of the keyboard and encouraged to practice finger positions at home (see Appendix C).

Scoring

At the conclusion of the four week period, the computer knowledge test was administered again. The tests were scored by point value in the same manner in which the original tests were scored, and the final scores were recorded beside the original scores.

Analysis

Results of the pre-tests and post-tests were then arranged by grade level for comparison. The percentage of the mean gain scores for the experimental and control groups were compared at each grade level. The hypothesis was tested at the .05 level of confidence, and conclusions were drawn regarding the value of teaching typing as part of computer literacy and programming instruction.

Chapter 4

Results

Recording Procedures

The results of this study were organized and recorded by grade level. Each of the four grade levels, four through junior high, were divided into two categories; the control group, which received instruction in computer literacy and programming only, and the experimental group, which received typing instruction in addition to the computer literacy and programming class. Students from the control group and the experimental group were enrolled in the same computer literacy and programming classes, and course content remained standard within grade levels.

Individual scores were recorded for the pre-test, which was given at the beginning of the computer literacy and programming class, and for the post-test, which was given at the conclusion of the four week course. The point difference between these two tests was recorded as the gain. A mean gain was calculated for each control group and for each experimental group. Conclusions were drawn at each grade level on the basis of these mean gains.

Any student who had been absent would have been dropped from the study, however, no students were absent

during the study. One student withdrew from school prior to the end of the four week period and was dropped from the study. Sixty-nine participants remained; thirty-five in the control group, and thirty-four in the experimental group.

Table 1

Score Comparison of Control Group to Experimental Group in the Fourth Grade

Control Group				Experimental Group			
Student	Pre	Post	Gain	Student	Pre	Post	Gain
1	0	25	25	1	0	20	20
2	0	30	30	2	10	75	65
3	25	20	-5	3	10	40	30
4	0	20	20	4	5	60	55
5	5	40	35	5	10	43	33
6	0	20	20	6	15	40	35
7	25	20	-5	7	25	35	10
8	0	0	0	8	23	75	52
9	5	55	50	9	0	15	15
10	5	35	30	10	0	60	60
11	10	20	10	11	0	55	55
12	0	45	45	12	0	40	40
13	50	75	25	13	0	10	10

Table 1 (continued)

Student	Pre	Post	Gain	Student	Pre	Post	Gain
14	15	75	60	14	0	40	40
15	40	55	15	15	0	75	75
16	5	45	40	16	0	75	75
17	25	45	20				

Results

Fourth Grade Results

The fourth grade class was the largest group participating in this study. It consisted of thirty-three students, seventeen in the control group and sixteen in the experimental group. Although this grade level was divided into two separate classes for computer literacy and programming instruction, course content remained consistent and both contained an almost equal number of participants from the control group and from the experimental group of nine. The first class contained a control group of eight and an experimental group of nine. The second class began with a control group of ten and an experimental group of seven, however, one member of the control group withdrew midway through the study leaving a control group of nine and an experimental group of seven. The division was made

by the regular homeroom separation at the fourth grade level. In this section of the study, the control group showed a mean gain of twenty-four points. The mean gain in the experimental group proved to be forty-one points, leaving the experimental group with an increased mean gain of seventeen points over the control group. This table presented the data from this fourth grade study.

Table 2

Score Comparison of Control Group to Experimental Group in the Fifth Grade

Control Group				Experimental Group			
Student	Pre	Post	Gain	Student	Pre	Post	Gain
1	5	20	15	1	0	30	30
2	10	45	35	2	0	45	45
3	5	15	10	3	10	40	30
4	0	60	60	4	5	45	40
5	20	75	55	5	25	60	35
6	5	35	30	6	0	60	60
				7	10	40	30

Fifth Grade Results

The fifth grade class represented a small population

due to the fact that there is only one fifth grade class at the school. The control group consisted of six students, with an experimental group of seven students. These thirteen students were enrolled in the same section of the computer literacy and programming course. In this part of the study, the control group showed a mean gain of thirty-nine points. This indicated an increased mean gain for the experimental group of five points over the mean gain of the control group.

Table 3

Score Comparison of Control Group to Experimental Group in the Sixth Grade

Control Group				Experimental Group			
Student	Pre	Post	Gain	Student	Pre	Post	Gain
1	0	50	50	1	25	85	60
2	15	50	35	2	0	60	60
3	0	45	45	3	30	100	70
4	0	55	55	4	30	95	65
5	35	105	70	5	0	35	35
				6	10	65	55

Sixth Grade Results

The sixth grade population consisted of only eleven students, five of whom were in the control group, receiving computer literacy and programming instruction only, and six in the experimental group, receiving typing instruction in addition to computer literacy and programming. The control group showed a mean gain of fifty-one points. The experimental group recorded a mean gain of fifty-eight points, an increased mean gain of seven points. This was a slightly higher increase than that of the fifth grade experimental group, yet quite a bit lower than the increase of the fourth grade experimental group.

Table 4

Score Comparisons of Control Group to Experimental Group in the Junior High

Control Group				Experimental Group			
Student	Pre	Post	Gain	Student	Pre	Post	Gain
1	65	125	60	1	20	105	85
2	20	95	75	2	15	90	75
3	50	115	65	3	35	40	5
4	30	85	55	4	15	100	85
5	25	85	60	5	30	70	40

Student	Pre	Post	Gain	Student	Pre	Post	Gain
6	30	100	70				
7	15	95	80				

Junior High Results

The junior high class was made up of ten seventh graders and two eighth graders. The control group consisted of seven students, with an experimental group of five. The results of this portion of the study did not reflect the results of the other three sections. The control group showed a mean gain of sixty-six points. The experimental group recorded only a fifty-eight point mean gain. The control group exhibited an increased mean gain of eight points over that of the experimental group in this section of the study.

Table 5

Score Comparison of Control Group to Experimental Group in Overall Study

Control Group				Experimental Group			
Student	Pre	Post	Gain	Student	Pre	Post	Gain
1	0	25	25	1	0	20	20
2	0	30	30	2	10	75	65

Student	Pre	Post	Gain	Student	Pre	Post	Gain
3	25	20	-5	3	10	40	30
4	0	20	20	4	5	60	55
5	5	40	35	5	10	43	33
6	0	20	20	6	15	40	25
7	25	20	-5	7	25	35	10
8	0	0	0	8	23	75	52
9	5	55	50	9	0	15	15
10	5	35	30	10	0	60	60
11	10	20	10	11	0	55	55
12	0	45	45	12	0	40	40
13	50	75	25	13	0	10	10
14	15	75	60	14	0	40	40
15	40	55	15	15	0	75	75
16	5	45	40	16	0	75	75
17	25	45	20	17	0	30	30
18	5	20	15	18	0	45	45
19	10	45	35	19	10	40	30
20	5	15	10	20	5	45	40
21	0	60	60	21	25	60	35
22	20	75	55	22	0	60	60
23	5	35	30	23	10	40	30
24	0	50	50	24	25	85	60
25	15	50	35	25	0	60	60
26	0	45	45	26	30	100	70

Student	Pre	Post	Gain	Student	Pre	Post	Gain
27	0	55	55	27	30	95	65
28	35	105	70	28	0	35	35
29	65	125	60	29	10	65	55
30	20	95	75	30	20	105	85
31	50	115	60	31	15	90	75
32	30	85	55	32	35	40	5
33	25	85	60	33	15	100	85
34	30	100	70	34	30	70	40
35	15	95	80				
	540	1880	1340		358	1923	1575
Mean =	15.43	53.71	38.29		10.53	57.15	46.32
ss =	69700				88493		

Table 6

t - Test

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{s^2\left(\frac{1}{N_1} + \frac{1}{N_2}\right)}} \qquad \text{where } s^2 \text{ is pooled}$$

$$s^2 \text{ pooled} = \frac{\Sigma(x_1 - \bar{x})^2 + \Sigma(x - \bar{x}_2)^2}{N_1 + N_2 - 2}$$

$$= \frac{69700 + 88493}{35 + 34 - 2}$$

$$= \frac{158193}{67}$$

$$= 2361.0896$$

$$t = \frac{38.29 - 46.32}{\sqrt{2361.09\left(\frac{1}{35} + \frac{1}{34}\right)}}$$

$$= \frac{-8.03}{\sqrt{2361.09(.0285714 + .0294117)}}$$

$$= \frac{-8.03}{\sqrt{2361.09(.0579831)}}$$

$$= \frac{-8.03}{\sqrt{136.90347}}$$

$$= \frac{-8.03}{11.700576}$$

$$= 0.686291$$

Hypothesis

The hypothesis in this study is as follows:

> Students who receive typing instruction in addition to computer literacy and programming classes will make significant mean gains in computer literacy and programming classes without additional typing instruction.

The overall mean gain in the control group was 38.29 points. The overall mean gain in the experimental group was 46.32 points. This shows an increase of 8.03 points favoring the experimental group. Although these data indicate an increase in the mean gain of the experimental group, a t-test of the mean differences was only 0.69. Significance at the .05 level of confidence is 2.00, therefore this t-test is not significant and the hypothesis was not supported.

Summary

At each of the three earlier grade levels and for the overall mean scores, there was a superior gain for the experimental group over the control group, leading to the conclusion that although there is no significant difference between the experimental and the control groups that is greater than chance at the .05 level of confidence, there may have been a tendency toward superiority favoring the

experimental treatment. Overall the hypothesis was not supported by this study.

Chapter 5

Conclusions

Summary

This study investigated the following hypothesis:

> Students who receive typing instruction in addition to computer literacy and programming classes will make significant mean gains in computer application over those who receive computer literacy and programming classes without additional typing instruction.

The study was preceded by a computer survey to determine eligibility to participate in the process. Students from grades four through eight were selected and placed in a class with other students at their grade level. approximately half of the students at each grade level were randomly selected to receive typing instruction in addition to a computer literacy and programming class. All students were then given a computer knowledge test and their individual scores were recorded. Computer literacy and programming classes were conducted for four weeks. Typing classes were also held for four weeks. At the end of the four week period, the computer knowledge test was again administered to all participants. The scores for

this second test were also separated and averaged by grade level for each of the control groups and each of the experimental groups. Comparisons were than made as to which groups registered a higher mean gain.

An increase of seventeen points was seen in the mean gain of the experimental group over the mean gain of the control group. The fifth and sixth grade levels showed less of a gain. Each of these levels registered a slightly higher mean gain by the experimental group. The seventh and eight grade results showed no gain over the control group. In all, the experimental group scored a mean gain of eight points less than the control group.

The overall results of the study did not support the hypothesis on the basis of the t-test. Although some increase in the mean gain was evident in favor of the experimental group, it did not meet the .05 level of confidence. It therefore was determined not to be significant.

Therefore, this study does not support the inclusion of typing instruction with computer literacy. However, as pointed out in the limitations of the study, the amount of time spent in instruction was short and may have been insufficient to test the merits of the added typing instruction. This may be indicated by the tendency, although insignificant, toward greater mean gains on the

part of the experimental group.

Although this study did not support the hypothesis, it may indicate the need for further investigation into this topic.

Recommendations

It is recommended that additional research be conducted concerning this area of study, particularly in the junior high school population. Specifically, it is suggested that a similar study be conducted over a longer period of time.

A study which would provide typing instruction prior to beginning a computer literacy and programming class would also be of benefit to this question regarding computer curriculum. It is possible that typing skills acquired in advance of a computer class may prove to be an important asset. This may make a marked difference on a study of this type.

COMPUTER SURVEY

NAME _____ GRADE _____

A 1. Do you have a computer at home? _____
2. If so, what kind? _____
3. In what ways do you use it? _____

_____

B How often have you used computers for the following ?

	never	sometimes	often
1. Playing games			
2. Educational programs			
3. Basic programming			
4. Graphics			
5. Typing			
6. Word Processing			
7. Data entry			
8. Other			

C Which of the following computers have you used?

1. Apple //e or //c ☐
2. Commodore ☐
3. IBM ☐
4. TRS-80 ☐
5. Atari ☐
6. Other _____ ☐

D Have you ever taken a typing class? _____
If so, how many words-per-minute do you type? _____

E What would you be interested in learning about computers?

_____

APPENDIX B

COMPUTER KNOWLEDGE TEST

1. What are the 3 main components of a computer? _____
   _____ _____
2. When is it safe to remove a disk from the disk drive? _____
3. List 3 important rules for taking care of a computer disk.
   _____
   _____
   _____
4. What is the flashing square called, and what is it good for? _____
   _____
5. How do you clear the screen? _____
6. What does ?SYNTAX ERROR mean? _____
7. What does the NEW do? _____
8. What key do you press after every command? _____
9. What is a program? _____
   _____
10. How do you run a program? _____
11. How do you erase a program from memory? _____
12. What is the DEL key used for? _____
13. What is REM used for? _____
14. What do the following do to PRINT?
    semicolon at the end _____
    semicolons between items _____
    commas between items _____
15. What are characters in a row called? _____
16. How do you add a line to the middle of a program? _____
17. What do quotation marks do? _____
18. What is BASIC? _____
19. How should you number a program with 3 lines? _____
20. What is a command? _____
21. Write a program which will print your name. _____
    _____
22. Write a program which uses input (on back).

APPENDIX C

KEYBOARD MODEL

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